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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/682,151	07/27/2001	Martin E. Kordesch	XDEV1100	5628

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EXAMINER

CHU, CHRIS C

ART UNIT PAPER NUMBER

2815

DATE MAILED: 01/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/682,151

Applicant(s)

KORDESCH ET AL.

Examiner

Chris C. Chu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 October 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 15 is/are pending in the application.
- 4a) Of the above claim(s) 1 - 8 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9 - 15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on October 7, 2002 has been received and entered in the case.

Oath/Declaration

2. A new oath or declaration is required because the photocopied pages of the declaration do not show the inventor's signatures. The wording of an oath or declaration cannot be amended. If the wording is not correct or if all of the required affirmations have not been made or if it has not been properly subscribed to, a new oath or declaration is required. The new oath or declaration must properly identify the application of which it is to form a part, preferably by application number and filing date in the body of the oath or declaration. See MPEP §§ 602.01 and 602.02.

Since applicant has not responded or amended to in response the requirement in the above paragraph, the Examiner requests a new oath or declaration again in this Office action.

Drawings

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: on page 7, line 4 of the specification refers to a silicon carbide “60” which is not referenced in the figures. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the limitation in claim 14 “surfaces of the insulating layer and metal contacts furthest from the substrate lie in substantially a same plane” must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

5. Applicant is required to submit a proposed drawing correction in reply to this Office action. However, formal correction of the noted defect may be deferred until after the examiner

has considered the proposed drawing correction. Failure to timely submit the proposed drawing correction will result in the abandonment of the application.

Since applicant has not responded or amended to the objections in the above paragraphs, the objections are maintained.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 14 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 14 and 15, the terms "substantially" and "approximately" are relative terms which render the claims indefinite. The terms "substantially" and "approximately" are not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Since applicant has not responded or amended to the rejection in the above paragraphs, the rejection is maintained.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 9 ~ 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beilstein, Jr. et al. in view of Tsuji et al.

Regarding claim 9, Beilstein, Jr. et al. discloses in Fig. 10 and column 7, lines 10 ~ 12 a semiconductor device comprising:

- a first active layer (29') including a first semiconductor material and having a first conductive type;
- a second active layer (31') including a second semiconductor material and having a second conductivity type opposite the first conductivity type, wherein the second active layer contacts the first active layer;
- a third active layer (27') including a third semiconductor material and having the first conductive type, wherein:
 - o the third active layer contacts the second active layer; and
 - o a combination of the first, second, and third active layers are at least part of a transistor;
- an opening (at the place of 43) extending through the third active layer and contacting the second active layer;

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- a fourth semiconductor material (47) at least partially within the opening,
 - o wherein the fourth compound semiconductor material:
 - o has the second conductivity type and a dopant concentration higher than a dopant concentration of the second active layer; and is electrically connected to the second active layer; and an insulating layer (43 and 52) at least partially within the opening, wherein the insulating layer lies between the third active layer and the fourth compound semiconductor material.

Beilstein, Jr. et al. does not disclose compound semiconductor materials. However, Tsuji et al. teaches in column 3, lines 13 ~ 16 using compound semiconductor materials instead of semiconductor materials. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Beilstein, Jr. et al. by substituting compound semiconductor materials for semiconductor materials as taught by Tsuji et al. The ordinary artisan would have been motivated to modify Beilstein, Jr. et al. in the manner described above for at least the purpose of decreasing manufacture cost.

Regarding claim 10, Tsuji et al. teaches in column 3, lines 13 ~ 16 each of the first, second, third, and fourth compound semiconductor material including at least two Group IVA elements.

Regarding claim 11, Tsuji et al. teaches in column 3, lines 13 ~ 16 the first, second, third, and fourth compound semiconductor material comprising silicon carbide.

Regarding claim 12, Beilstein, Jr. et al. discloses in Fig. 10 electrical contacts (53 and 49) to the third active layer and the fourth compound semiconductor material.

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10. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beilstein, Jr. et al. and Tsuji et al. as applied to claims 9 and 12 above, and further in view of Liu.

Regarding claim 13, Beilstein, Jr. et al. and Tsuji et al. disclose the claimed invention except for the electrical contacts being ohmic. However, Liu teaches in column 7, lines 64 and 65 electrical contacts being ohmic. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to further modify Beilstein, Jr. et al. by using ohmic for the electrical contacts as taught by Liu. The ordinary artisan would have been motivated to further modify Beilstein, Jr. et al. in the manner described above for at least the purpose of providing an electrical ground (column 7, line 66).

Regarding claim 14, Beilstein, Jr. et al. discloses in Fig. 10 surfaces of the insulating layer and contacts furthest from the substrate lie in substantially a same plane except for metal contacts. However, Liu teaches in column 4, lines 51 ~ 53 metal in the contact. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to further modify Beilstein, Jr. et al. by using metal in the contacts as taught by Liu. The ordinary artisan would have been motivated to further modify Beilstein, Jr. et al. in the manner described above for at least the purpose of increasing speed of I/O data.

11. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beilstein, Jr. et al. and Tsuji et al. as applied to claim 9 above, and further in view of Driver et al.

Beilstein, Jr. et al. and Tsuji et al. disclose the claimed invention except for the second active layer having a thickness in a range of approximately 0.1 – 2 microns. However, Driver et

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al. discloses in column 4, lines 24 ~ 34 an active layer having a thickness in a range of approximately 0.1 – 2 microns. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to further modify Beilstein, Jr. et al. by using the thickness in a range of approximately 0.1 – 2 microns for the second active layer as taught by Driver et al. The ordinary artisan would have been motivated to further modify Beilstein, Jr. et al. in the manner described above for at least the purpose of decreasing doping concentration (column 4, lines 28 ~ 34).

Response to Arguments

12. Applicant's arguments filed on October 7, 2002 are found persuasive. See new Office action above.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is (703) 305-6194. The examiner can normally be reached on M-F (10:30 - 7:00).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Chris C. Chu
Examiner
Art Unit 2815

c.c.
December 23, 2002



EDDIE LEE
SUPERVISOR, ART UNIT 2815
TECHNOLOGY CENTER